

ABSTRACT OF THE INVENTION

The invention provides a process for forming a low k fluorine and carbon-containing silicon oxide dielectric material by reacting with an oxidizing agent one or more silanes containing one or more organofluoro silanes having the formula  $\text{SiR}_1\text{R}_2\text{R}_3\text{R}_4$ , where: (a)  $\text{R}_1$  is selected from H, a 3 to 10 carbon alkyl, and an alkoxy; (b)  $\text{R}_2$  contains at least one C atom bonded to at least one F atom, and no aliphatic C-H bonds; and (c)  $\text{R}_3$  and  $\text{R}_4$  are selected from H, alkyl, alkoxy, a moiety containing at least one C atom bonded to at least one F atom, and  $((\text{L})\text{Si}(\text{R}_5)(\text{R}_6))_n(\text{R}_7)$ ; where n ranges from 1 to 10; L is O or  $\text{CFR}_8$ ; each n  $\text{R}_5$  and  $\text{R}_6$  is selected from H, alkyl, alkoxy, and a moiety containing at least one C atom bonded to at least one F atom;  $\text{R}_7$  is selected from H, alkyl, alkoxy, and a moiety containing at least one C atom bonded to at least one F atom; and each  $\text{R}_8$  is selected from H, alkyl, alkoxy, and a moiety containing at least one C atom bonded to at least one F atom. Also provided is a low dielectric constant fluorine and carbon-doped silicon oxide dielectric material for use in an integrated circuit structure which contains: silicon atoms bonded to oxygen atoms; silicon atoms bonded to carbon atoms; and carbon atoms bonded to fluorine atoms; where the dielectric material also has a characteristic selected from: (a) the presence of at least one C-C bond; (b) the presence of at least one carbon atom bonded to from 1 to 2 fluorine atoms; and (c) the presence of at least one silicon atom bonded to from 0 to 2 oxygen atoms.